

**PATENT APPLICATION**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of

Docket No: Q82799

Ludovic NOIRIE

Appln. No.: 10/509,429

Group Art Unit: 2874

Confirmation No.: 3427

Examiner: Michael J. Stahl

Filed: September 24, 2004

For: BROADCAST SIGNAL CROSS-CONNECT UNIT, IN PARTICULAR FOR OPTICAL SIGNALS

**AMENDMENT UNDER 37 C.F.R. § 1.111**

**MAIL STOP AMENDMENT**

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Sir:

In response to the Office Action dated April 21, 2006, please amend the above-identified application as follows on the accompanying pages.

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### **AMENDMENTS TO THE CLAIMS**

**This listing of claims will replace all prior versions and listings of claims in the application:**

#### **LISTING OF CLAIMS:**

1. (Presently amended) A space cross-connect unit (Z) with N input ports ( $E_i$ ) and P output ports ( $S_i$ ), comprising:

a broadcast stage comprising at most N signal dividers ( $A_i$ ) each having one input and C outputs where C is an integer factor of P less than P, each input being connected to one of said N input ports ( $E_i$ ) so that each of said N dividers ( $A_i$ ) divides a signal received at one of said N input ports ( $E_i$ ) into C signals at said C outputs, and

a space switching stage comprising at most C space switching modules ( $B_i, B'_i$ ),

~~which said space~~ cross-connect unit is characterized in that:

the  $[[C]]$  space switching modules ( $B_i, B'_i$ ) are non-blocking and non-broadcasting, and each of said  $[[C]]$  space switching modules ( $B_i, B'_i$ ) has N inputs and P/C outputs, said N inputs are connected to N outputs of said broadcast stage, each of said N outputs comes from a different divider ( $A_i$ ), and each of said P/C outputs of said  $[[C]]$  space switching modules ( $B_i, B'_i$ ) is connected to a respective one of said P output ports ( $S_i$ ), wherein said space cross-connect unit is configured for packet switching and circuit switching, and wherein said space cross-connect unit is adapted to provide broadcasting of input signals independently of spectral considerations.

2. (Original) A cross-connect unit (Z) according to claim 1, comprising exactly N dividers ( $A_i$ ) and C modules ( $B_i, B'_i$ ).

3. (Presently Amended) A cross-connect unit (Z) according to claim 1, characterized in that each of said [[C]]space switching modules ( $B_i, B'_i$ ) comprises means for connecting each of its N inputs to one of its P/C outputs.

4. (Presently Amended) A cross-connect unit (Z) according to claim 1, characterized in that each of said [[C]]space switching switching modules ( $B_i, B'_i$ ) is a non-blocking switching matrix ( $B_i$ ) with N inputs and P/C outputs.

5. (Presently Amended) A cross-connect unit (Z) according to claim 1, characterized in that each of said [[C]]space switching switching modules ( $B'_i$ ) comprises:

K non-blocking switching matrices ( $F_i$ ) with N/K inputs and P/C outputs, where K is an integer factor of N; and

P/C non-blocking switching matrices ( $G_i$ ) with K inputs and one output, each of said K inputs being connected to a respective output of each of said K switches ( $F_i$ ).

6. (Presently Amended) A cross-connect unit (Z) according to claim 1, characterized in that at least one of said [[C]]space switching switching modules ( $B'_i$ ) comprises:

K non-blocking switching matrices ( $F_i$ ) with N/K inputs and P/C outputs, where K is an integer factor of N; and

P/C non-blocking switching matrices ( $G_i$ ) with  $K$  inputs and one output, each of said  $K$  inputs being connected to a respective output of each of said  $K$  switches ( $F_i$ ).

7. (Presently Amended) A cross-connect unit ( $Z$ ) according to claim 1, characterized in that said P/C switching matrices ( $G_i$ ) are semiconductor optical amplifier (SOA) switches.

8. (Original) A cross-connect unit ( $Z$ ) according to claim 1, characterized in that said number  $N$  of input ports is equal to said number  $P$  of output ports.

9. (Original) A cross-connect unit ( $Z$ ) according to claim 5, characterized in that  $K$  is equal to  $C$ .

10. (Original) A cross-connect unit ( $Z$ ) according to claim 1, characterized in that said switching stage uses a technology based on  $\text{LiNbO}_3$ .

11. (Presently Amended) A cross-connect unit ( $Z$ ) according to claim 1, characterized in that each of said P/C outputs of said  $[[C]]$  space switching modules ( $B_i, B'_i$ ) is followed by an amplifier ( $D_i$ ).

12. (Presently Amended) A cross-connect unit according to claim 1, characterized in that ~~each of said N inputs of said N divider~~the input of each divider is preceded by an amplifier ( $D_E$ ).

13. (Presently Amended) A cross-connect unit (Z) according to claim 1, characterized in that each of said space switching modules ( $B_i, B'_i$ ) comprises:

a first stage comprising polarization-maintaining space switching matrices ( $M_1, \dots, M_k$ );  
 and  
 a second stage comprising polarization-maintaining semiconductor optical amplifiers ( $(MQWSOA_1, \dots, MQWSOA_k)(MQWSOA_1, \dots, MQWSOA_k)$ ).

14. (Previously Presented) A signal transmission system comprising a cross-connect unit (Z) according to claim 1 and characterized in that said system comprises:

at least one multiplexer for multiplexing M signals having M different wavelengths  $(\lambda_i)_{1 \leq i \leq M}$ , where M is an integer less than or equal to N;  
 at least one erbium-doped fiber amplifier (EDFA) for amplifying the multiplexed signal;  
 and  
 at least one demultiplexer for demultiplexing the multiplexed signal to yield M demultiplexed signal that are input to M input ports of said cross-connect unit.

15. (New) A cross-connect unit (Z) according to claim 6, characterized in that said P/C switching matrices ( $G_i$ ) are semiconductor optical amplifier (SOA) switches.

16. (New), The cross-connect unit of claim 1, wherein said number of dividers is less than N.